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Scan-classify-overlay model for Bozo and Bangime nominal tones

Le modèle « scanner – classifier – superposer » pour les tons nominaux en bozo et bangime

ДЖЕФФРИ ХИТ

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МОДЕЛЬ «ПРОСМОТР-КЛАССИФИКАЦИЯ-НАЛОЖЕНИЕ» ДЛЯ ТОНОВ В ИМЕННЫХ ГРУППАХ В ЯЗЫКАХ БОЗО И БАНГИМЕ

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Scan-classify-overlay model for Bozo and Bangime nominal tones

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1. Scanning and classifying input stems in morphophonology

An analogue of the tonal scan-classify-overlay model used here is implicit in the analysis of morphological processes that constrain input shapes, based on minimum and/or maximum syllable counts of inputs or other phonological criteria. A familiar example is English adjectival comparative *-er*, as in *blue-er*, *bigger*, *happier*, and (for some speakers) *funner*, but not #*interesting-er* or #*forthright-er*. In such cases, inputs are scanned and either accepted or rejected. The scanning process has a **gate-keeping** function. Rejected inputs default to a phrasal alternative, e.g. *more interesting*. Inputs are treated like products on an industrial conveyor belt that is equipped with a reject device for quality control.

Other morphophonological processes are known that likewise involve scanning and classification, but that have **sorting** functions. Inputs are grouped into classes, each of which is then subjected to its own customized process. Here the industrial analogue is package-sorting facilities that scan barcodes of parcels moving on a conveyor belt and divert the parcels into bins for delivery to various destinations. A well-known, though often misunderstood, morphophonological example is Standard Arabic, whose noun, adjective, and verb stems are sorted into weight classes. The main division is between stems whose count of C-filling segments (consonants and long vowels, but not short vowels) is three or fewer (light) versus four or more (heavy). For example, the active participle takes the form CaaCiC for light verbs, versus a *mu*-prefixed form like muCaCCiC or muCCiC for heavy verbs of various shapes. Similarly, light noun stems have ablaut plurals with shapes like ʔaCCaaC, CiCaaC, and CuCuuC, while heavy stems have CaCaaCiC or CaCaaCiiC. In Arabic ablaut, the outputs sometimes resemble the inputs in form, particularly in verbal derivation. However, outputs sometimes diverge sharply from inputs, especially in nominal and adjectival pluralization. For example, the productive plural of CiCaaC singular nouns is plural ʔaCCiC-at (with pseudo-feminine suffix), and there is no reasonable way to derive the plural from the singular by means of local phonological operations.

The common element shared by the comparative *-er* gate-keeping process and the Arabic sorting process is that the phonological criteria are **quantitative** (number of syllables or number of C-filling segments). Bozo and Bangime tonal ablaut processes involve sorting into classes, as with Arabic, rather than gate-keeping. However, the sorting criteria are qualitative rather than quantitative. Like Arabic, Bozo and Bangime apply stem-wide ablaut overlays customized for each class of inputs, with overlays that sometimes share no phonological material with the input. Unlike Arabic, whose ablaut is restricted to word level, Bozo and Bangime ablaut applies to compounds or to noun-modifier combinations. Also unlike Arabic, Bozo (though not Bangime) ablaut triggered by one stem is sometimes realized on the following stem.

The classes that result from sorting in all of these cases are based on exclusively phonological criteria. This distinguishes them from inflectional classes that are phonologically underdetermined, such as the nominal-adjectival declensions and verbal conjugations of Spanish and other Indo-European languages.

For adult Bozo/Bangime speakers, the full scan-classify-overlay sequence is most salient cognitively in novel combinations, for example when a borrowed or innovated noun combines for the first or second time with a modifying adjective or occurs as part of a new compound. With usage over time, the ablauted stem-shape can become routinized as an allo-stem, and it then constitutes the fixed part of a low-level morphosyntactic construction that also has an open slot. For example, a new compound like 'rice-field' could lead to the generalization of compound constructions 'X-field' (hence 'millet-field', 'peanut-field', etc.) and 'rice-Y' (hence 'rice-grain', 'rice-stem', etc.), where the forms of 'field' as final and of 'rice' as initial can be routinized. Indeed, irregular segmental or tonal variants for a stem tend to generalize in compounds. For example, in Tigemaxo /HL/-melodic *cíè* 'field' is treated irregularly, but consistently, as though it were /H/-melodic *cié* as final in compounds.

The model proposed here differs from other treatments in a) shining a bright spotlight on the scanning process, and b) analysing ablaut in terms of stem-wide overlays. (a) will be apparent throughout. Regarding (b), the key point is that the ablaut is not just an ordinary phonological process that happens to be morphologically restricted. For example, when a trisyllabic L.H.M stem is converted to L.L.L as part of a compound, a phonological model would argue that the initial L "spreads" rightward to the right edge of the stem. The output is then just a rearrangement of input elements. There are two problems with this. First, the spreading is unmotivated phonetically and is not part of regular phonology. Second, it is formulated as a traditional phonological rewrite rule modeled on Newtonian physics: the initial L pushes rightward, ousting the lexical H.M. Such a kinetic model leaves unexplained the absence of any effect of the

H.M on the following word. By contrast, a strictly morphophonological model can overlay {L} on the L.H.M stem, erasing the entire lexical melody.

Informal kinetic formulations of such ablaut abound in reference grammars and spin-off articles, including my own. An example from Creissels on Malinké of Kita: "si la première syllabe du premier formant est associée à un ton bas, celui-ci étend son domaine jusqu'à la frontière avec le deuxième formant" (2009: 30).[1] It is difficult to wean ablaut morphophonology from generative phonology. The short section on Bangime at the end of the paper shows that ablaut overlays need not contain tone elements from the lexical melodies. Yet neither the Bozo nor Bangime examples involve replacive tone overlays.

2. Tones, tone melodies, computed melodic superclasses, and overlays

The four Bozo languages studied have either two levels (H and L) or three (H, M, and L). The neighboring isolate Bangime, also studied here, has three. In a three-tone system, M can merge with either H (as non-low) or L (as non-high) in any given (morpho-)tonological process, or M can function as covertly contoured LH (or HL). For purposes of this paper it suffices to consider the primary tones of the three-level system as a vertical array, disregarding the question of tonal or subtonal features proposed by Pulleyblank (1986), Yip (2002), Snider (2020), and Mamadou (2023) and the slipperiness of M-tones (Hyman 2023). Syllables with contour tones can be represented as combinations of two primary tones, e.g. falling <HL>. The tones in these languages present no notable nonmodal phonation features (e.g. creakiness). Downstep, though present elsewhere in some of the languages, is absent from Bozo N-N and N-Adj combinations and from Bangime definite and possessed NPs, and can be disregarded in this paper.

The interest of the Bozo and Bangime data concerns the relationship between (input) melodies and (output) overlays in noun and adjective stems. See §4 below for key definitions.

3. Bozo languages

Bozo (or Boso) is the established name for a family of four to five languages spoken chiefly in villages along the Niger River and its affluents in central Mali, West Africa. It is part of the vast Mande macro-family. Its main concentration begins north of Segou and continues north to Lac Débo, and includes many riverine villages around

[1] "If the first syllable of the first stem is associated with low tone, the latter extends its domain to the boundary with the second stem."

the cities Djenné and Mopti. The Bozo are the classic fishing people of this zone,[2] contrasting with Fulbe cattle herders, Dogon and Bambara cultivators, and Songhay and Fulbe merchants. A few atypical Bozo villages (speakers of Cliffs Jenaama) are Dogon-style millet farmers located away from rivers. Riverine Bozo, traditionally fishers, are increasingly engaged in rice farming made possible by modern irrigation infrastructure.

The inventory of Bozo languages and major dialects is (1). Data in this paper are from the four bolded varieties.

(1a) **Kelenga**
(b) Tigemaxo-Tiéyaxo
  i. **Tigemaxo**
  ii. Tiéyaxo
(c) Tiema Cewe
(d) Jenaama-Sorogaama complex
  i. **Cliffs Jenaama**
  ii. **Sorogaama** of the Djenné area
  iii. Jenaama of Djambakourou
  iv. other varieties

Basic word lists on several Bozo varieties (but not Cliffs) are presented in Smeltzer & Smeltzer (1995), cf. also the corrections in Blecke & Blecke (1997). Kelenga (for which the alternative name Hainyaxo should be rejected) is thought to be one genetic branch, sister to the complex branch containing the others. Tiema Cewe is underdocumented but is said to be genetically and structurally close to Tigemaxo-Tiéyaxo. Adequate data on tones and morphotonology are available for the bolded varieties from recent fieldwork (Jeffrey Heath 2023a; Jeffrey Heath 2023b; Jeffrey Heath 2023c; Jefferey Heath 2023). The other variety for which some tonology is available (Lauschitzky 2007; Wintoch 2000) is Jenaama of Djambakourou (1d.iii), but N-N and N-Adj tones are not described. Older literature, including Monteil (1932) and Daget, Konipo & Sanakoua (1953) on Bozo languages generally, and Blecke's morphosyntax of Tigemaxo (1996), are valuable in many respects but have little information on tones or morphotonology.

The genetic classification is muddied by the question whether the Jenaama-Sorogaama complex (1d) is one language with many dialects or (at least) two languages, cf. Blühberger (2006). The entire complex was formerly called Sorogaama

[2] Unusually rich ethnographic detail of traditional Bozo society and culture is presented in the four volumes of Ligers (1964).

in the literature, but this was then replaced by Jenaama.[3] For purposes of this paper, the terms used will be Sorogaama[4] (for Djenné-area varieties) and Cliffs.

4. Bozo tones and tonal melodies

The inventory of lexically distinctive tone elements in the four focal varieties is summarized in (2).

(2a) two lexical tone levels (H and L)
Kelenga
Sorogaama

(b) three lexical tone levels (H, M, and L)
Cliffs
Tigemaxo

Two-level and three-level systems are more similar than this might suggest. On the one hand, two-level Kelenga and Sorogaama both make phonologically systematic use of a derived M-tone (or pitch) at phrasal/clausal level, even though there are no lexical distinctions between M and H or between M and L. On the other hand, three-level Cliffs and Tigemaxo make only partial use of their tone distinctions at the lexical level. Tigemaxo does not distinguish /H/ from /L/ melodies, though it does distinguish e.g. /HL/ from /HM/. Cliffs has minimal trios for level-toned nouns (*sɔ́gɔ́* 'milk', *sɔ̄gɔ̄* 'day [counting unit]', *sɔ̀gɔ̀* 'sheep'), but not for verbs.

Melodies of N and Adj stems undergo significant modifications as initials and finals in N-N compounds and N-Adj sequences. There is no difference in tonal patterns between N-N and N-Adj. Certain combinations could be classified as either N-N or N-Adj. For example, Sorogaama *kɛ́ɛ́wú* can be a noun 'man' or an adjective 'male', so e.g. *dáábá kɛ́ɛ́wú* could be parsed either as N-Adj 'male animal' or as N-N compound 'animal-man'.

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[3] If the complex is divided into exactly two languages, the term Sorogaama might be revived to include the Djenné-area varieties, and Jenaama could be circumscribed to include Cliffs and perhaps Djambakourou. Alternatively, the geographically isolated and rather distinctive Cliffs could be elevated to the status of a separate language.

[4] *-ama* is a derivational suffix denoting (sub-)ethnicities, cf. English *-hood* as in *Bozo-hood* or *nation* as in *Bozo nation*. The *-ama* derivative can also denote the associated language/dialect. Sorogaama is derived from a variant of Sorko, the historical core of Bozo fishing people. Jenaama is derived from the city Djenné, but it is applied in the vernacular to Bozo people settled north and east of Mopti (far from Djenné) that trace their ancestry to the Djenné region. Djenné city itself has an urban Songhay dialect closely related to the Koyra Chiini of Timbuktu.

Notes on terminology and notation. A **melody** is a distinctive stem-wide tonal pattern observable in citation pronunciations. It is cited in single slashes /…/. Depending on the number of melodic **tone elements**, the melody can be monotonal /H/, /M/, and /L/, bitonal like /ML/ and /LH/, or multitonal like /LHL/ and /HLHL/. It is immaterial to this paper whether melodies are true autosegmental strings whose tones are automatically associated to tone-bearing units, or whether tones are partially or exhaustively pre-attached to TBUs. If tones are preattached, a "melody" for purposes of this paper is just a linearized list of the distinct tones in the stem. For example, both *CV́CV̀CV̀* (H.L.L syllable sequence) with **left-biased** tone break and *CV́CV́CV̀* (H.H.L) with **right-biased** tone break are here assigned to /HL/ melody, since the location of the tone break happens to be disregarded in the ablaut phenomena under consideration.[5]

For stems functioning as components in N-N and N-Adj, the set of melodies is reduced to two **melodic superclasses** by simple **computations** that **scan** the melodies (or the syllable-by-syllable strings) in search of specific tonal information. Combining the data from the four focal Bozo varieties, the looked-for features can be any of those in (3).

(3) a. the leftmost tone element,
b. presence/absence of a low tone,
c. presence/absence of a tone break (i.e. contour versus level).

Each such scan feeds into a computational reorganization that combines the numerous melodies into two melodic superclasses. The opposition is necessarily binary for (3b-c), and if the language has only two tone levels it must also be binary for (3a). For languages with three tone levels (Cliffs, Tigemaxo), (3a) could theoretically produce a ternary opposition, but in fact it reduces to a binary opposition by merger of M and H tones as part of the computation. Tigemaxo diverges from the other three languages in having a more complex four-way division in finals, though it agrees with them in having a binary split for initials.

Melodic superclasses are cited with all-caps labels in square brackets, e.g. [LEFT.LOW] or [CONTOUR], as defined below separately for each language. Since the oppositions are not obviously privative, each melodic superclass has its own label, without + or -. The labels themselves have no special theoretical status.[6]

[5] In other analytical contexts, the distinction between right-biased /H*L/ and left-biased /HL*/ (sub-)melodies would be significant, for example as an argument against strict autosegmental modeling.

[6] For Bozo, the labels accurately represent the criterion by which melodies are grouped into melodic superclasses. However, a scan-classify-overlay model could also be viable for nonunitary classes, as long as the classificatory criteria are explicitly phonological. For

Each of the opposed melodic superclasses produced by these computations is then associated with a stem-wide overlaid tone pattern, hereafter simply an **overlay**. The overlay of a stem depends on whether it is the **initial** or the **final** in N-N and N-Adj. Occasionally there is an overlay that applies globally to the entire N-N or N-Adj. Conversely, an overlay may affect just a portion of a stem, for example starting at its left edge. Overlays are cited in {…}, e.g. {L} and {HL}. The system of overlays constitutes the **tonal ablaut** system of the language.

In some cases it may be questioned whether the surface tones of the initial are due to a stem-wide overlay or are the result of a stem-internal phonological process that partially modifies the melody. This is especially the case when the overlay is {L} or {H} and is determined by the leftmost tone of the melody. One is tempted to argue that the leftmost tone spreads from its starting point at the left edge to (at least) the boundary in N-N and N-Adj. This would be descriptively adequate, and this description is used informally in the reference grammars. However, a rightward tone-spreading process in regular phonology should push any leftover tone elements to the right edge of the stem, or onto a following stem or word, analogously to Newtonian mechanics. For example, if the melody of an initial is /LHL/ and the leftmost L spreads rightward by a true phonological process, one would expect that the leftover HL sequence would be overtly expressed in some form at or near the right edge of the stem. This is not the case in Bozo N-N and N-Adj initials, where the leftover tone elements are erased without a trace. This supports the view that {H} and {L} are stem-wide overlays (morphophonology, ablaut) rather than the result of tone-spreading (phonology).

In addition, the overlay is not always a simple phonological complexification or simplification of the melody. Bozo stems whose melodic superclass is [LEVEL] may surface with tones that are absent from the melody, and stems whose melodic superclass is [CONTOUR] may surface with tones that have been reordered in comparison to the melody (e.g. /LH/ → {H*L}). A more extreme lexical-to-surface mismatch, where lexical tones are inverted, will be described later for Bangime. Only a scan-classify-overlay model is sufficiently general to capture all of these lexical-to-overlay relationships.

N-N and N-Adj are treated the same in tonal processes, but have opposite semantic headedness relations (a *doghouse* is a kind of house, but an *attorney general* is a kind of attorney). I therefore refrain from describing the tonal processes as **head-marking**, the term used in Green & Konoshenko (2022), who survey tonal processes applying

example, in a given language there might be a bimodal class consisting of all monosyllabic stems plus those longer stems that begin with voiceless obstruents. In such cases any one-word label for the class would be a term of art.

mainly to finals in N-N compounds in a wide range of Mande languages. Aside from the semantics, tonal ablaut in Bozo languages applies to both initials and finals, and if anything more fully to initials than to finals. These processes do not "mark" or highlight the head as such, they mark the two-part sequence as a compound. Even in other Mande languages where only the initial or only the final undergoes a tonal effect, the function of this effect is to indicate the morphosyntactic status of the combination, e.g. N-N compound as opposed to possessor-possessum or the accidental adjacency of two NPs.[7]

Details for each of the four focal Bozo languages are presented below in the following order: Sorogaama, Cliffs, Kelenga, and Tigemaxo. Parallels in Soninke are mentioned briefly in §9. The final section on Bangime drives home the point that overlays are associated with, not derived phonologically from, melodies.

5. Sorogaama: initials (leftmost tone), finals (tone break)

The tones of Sorogaama N-N compounds and N-Adj are generated from the melodies of the initial and final as modeled in (4). This language has two tone levels, H and L.

Morphotonological processes in N-N and N-Adj (Sorogaama)

(4a) classify the initial as [LEFT.HIGH] if its leftmost melodic tone element is H;
[LEFT.LOW] if its leftmost melodic tone element is L;

(b) associate [LEFT.HIGH] initials with {H} overlay;
[LEFT.LOW] initials with {L} overlay;

(c) classify the final as [CONTOUR] if its melody contains a tone break;
[LEVEL] if its melody contains no tone break;

(d) if the final is [LEVEL], spread the initial's overlay to the end of the final;
[CONTOUR], associate it with {H*L} overlay (right-biased).

Underived nouns can have any of the melodies /H/, /L/, /HL/, /LH/, /LHL/, and (rarely) /HLH/. Without the leveling processes in (4), N-N compounds could have 6x6 = 36 output tone patterns. (4) reduces this to four outputs.

Monotonal /H/ and /L/ melodies constitute the [LEVEL] melodic superclass in Sorogaama, since stems of these melodies have no internal tone break. Examples of N-

[7] Similarly, in Dogon NP tonosyntax, tone overlays controlled by a modifier such as a demonstrative (Dem) apply to a domain consisting of not only the "head" (i.e. the noun) but also any intervening modifiers, as in [N Adj Num]^{L} Dem. What is marked is not the head as such, rather the construction.

N compounds with [LEVEL] finals are in (5). The outputs are either all-L (5a) or all-H (5b), depending solely on the leftmost tone of the initial.[8]

(5a) initial is [LEFT.LOW], from melody /L/, /LH/, or /LHL/

i. final has /H/ melody, sequence appears as L-L

dòbò 'river' + *sóó* 'grass' → *dòbò-sòò* 'river grass'
nɔ̀gí-j̀ 'in village' + *sóó* 'grass' → *[nɔ̀gì-j̀]-sòò* 'grass in village'[9]
sòfáárà (town) + *súbáⁿ* 'market' → *sòfààrà-sùbàⁿ* 'Sofara market'

ii. final has /L/ melody, sequence appears as L-L

kɔ̀tɔ̀ 'back' + *dìjɛ̀* 'pain' → *kɔ̀tɔ̀-dìjɛ̀* 'back pain'
nìjɛ́rɛ̀ⁿ 'tongue' + *dìjɛ̀* 'pain' → *nìjɛ̀rɛ̀n-dìjɛ̀* 'tongue pain'

(5b) initial is [LEFT.HIGH], from melody /H/ or /HL/

i. final has /H/ melody, sequence appears as H-H

síré 'rock' + *sóó* 'grass' → *síré-sóó* 'rock grass'
dáábà 'animal' + *súbáⁿ* 'market' → *dáábá-súbáⁿ* 'livestock market'

ii. final has /L/ melody, sequence appears as H-H

ɲííⁿ 'tooth' + *dìjɛ̀* 'pain' → *ɲíín-díjɛ́* 'toothache'
kúràà 'hip' + *dìjɛ̀* 'pain' → *kúráá-díjɛ́* 'hip pain'

Examples of Sorogaama N-N compounds with [CONTOUR] finals are in (6). The outputs are either L-H*L (6a) or H-H*L (6b), depending on the leftmost tone of the initial. H*L in these formulae has a right-biased tone break. H.L.L *kóŋgòrò* 'dog' therefore shifts to H.H.L *-kóŋgórò* as final.

(6a) initial is [LEFT.LOW], from melody /L/, /LH/, or /LHL/

i. final has /HL/ melody, sequence appears as L-H*L

tùbáábù 'white (n)' + *kóŋgòrò* 'dog' → *tùbààbù-kóŋgórò* 'whites' dog'

ii. final has /LH/ melody, sequence appears as L-H*L

tùbáábù 'white (n)' + *sàbá* 'chicken' → *tùbààbù-sábà* 'whites' chicken'
wàj 'today' + *sàbá* 'chicken' → *wàj-sábà* 'modern chicken'
wàj 'today' + *tùmpànáⁿ* 'gourd' → *wàj-túmpánàⁿ* 'modern gourd'

iii. final has /LHL/ melody, sequence appears as L-H*L

dìgéⁿ 'yesterday' + *pàpórò* 'fishtrap' → *dìgèm-pápórò* 'traditional fishtrap'
wàj 'today' + *pàpórò* 'fishtrap' → *wàj-pápórò* 'modern fishtrap'

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[8] *j*, *ɟ*, and *ɾ* have IPA values in this paper. The reference grammars use *y*, *j*, and *r*, respectively. Long vowels are represented as digraphs, e.g. *óó*.

[9] Simple locative PPs with suffixal (or encliticized) locative *-j̀* can function as habitat-specifying initials.

(6b) initial is [LEFT.HIGH], from melody /H/ or /HL/

i. final has /HL/ melody, sequence appears as H-H*L
pánááⁿ 'long ago' + *kóŋgòrò* 'dog' → *pánááŋ-kóŋgórò* 'dog of old'

ii. final has /LH/ melody, sequence appears as H-H*L
pánááⁿ 'long ago' + *sàbá* 'chicken' → *pánáám-sábà* 'chicken of old'
fínà(w)ⁿ 'Fulbe' + *sàbá* 'chicken' → *fínáⁿ-sábà* 'Fulbe chicken'
fínà(w)ⁿ 'Fulbe' + *tùmpànáⁿ* 'gourd' → *fínán-túmpánàⁿ* 'Fulbe-style gourd'

iii. final has /LHL/ melody, sequence appears as H-H*L
pánááⁿ 'long ago' + *pàpórò* 'fishtrap' → *pánáám-pápórò* 'fishtrap of old'
fínà(w)ⁿ 'Fulbe' + *pàpórò* 'fishtrap' → *fínám-pápórò* 'Fulbe fishtrap'

The situation with N-Adj is similar. In other Bozo languages, it can be difficult to determine the melody of modifying adjectives. It is true that most modifying adjectives have corresponding stative predicative forms (with 'be' auxiliary), and the tones of the predicative forms might be taken as valid for the modifying forms as well. However, predicative forms often differ segmentally from modifying adjectives, so it is not clear that the two have identical melodies.

For Sorogaama, fortunately, N-Adj1-Adj2 with two modifying adjectives is divided into a prosodic word [N-Adj1] and a second prosodic word Adj2. The latter appears in its melody, unaffected tonally by [N-Adj1]. Examples are in (7).

(7a)	*[nàmàà*	*pìⁿjɛ̀-ná]*	*bòròⁿ*
	[house	black-Ppl]	big
	[N	Adj1]	Adj2

'big black house'

(7b)	*[nàmàà*	*pìⁿjɛ̀-nà]*	*dááⁿ*
	[house	black-Ppl]	distant
	[N	Adj1]	Adj2

'distant black house'

This construction shows that *bòròⁿ* 'big' has melody /L/, while *dááⁿ* 'distant' has melody /H/. The participial adjective *pìⁿjɛ̀-nà* 'black' undergoes tone sandhi to *pìⁿjɛ̀-ná* before another L-tone in (7a). This confirms that *[nàmàà pìⁿjɛ̀-nà]* and *bòròⁿ* are distinct prosodic words, since tone sandhi does not apply at internal boundaries within a prosodic word.

Since the melody of modifying adjectives can be determined by positioning them as Adj2, it is possible to show that N-Adj is subject to the same tonal processes as N-N. Attested melodies of underived (morphologically simple) modifying adjectives are /H/, /L/, and rarely /HL/. Deverbal participles with suffix *-na* have melodies /H/, /HL/,

/L/, and /LHL/. Adjectives with diminutive suffix *-gù* have melodies /HL/ and /LHL/. Taken together, underived and suffixal modifying adjectives have a range of melodies approximating those of nouns.

(8) illustrates Sorogaama N-Adj combinations whose final is of [LEVEL] melodic superclass (melodies /H/ and /L/). The tonal outputs are the same as those for N-N in (5) above. There are only two outputs, namely L-L (8a) and H-H (8b), the choice depending on the leftmost tone of the melody of the initial.

(8) a. initial is [LEFT.LOW], from melody /L/, /LH/, or /LHL/

i. adjective has /H/ melody, sequence appears as L-L

sùwɔ̀ 'sheep' + *kɛ́ɛ́wú* 'male' → *sùwɔ̀ kɛ̀ɛ̀wù* 'ram'
ɲàmáà 'house' + *dááⁿ* 'distant' → *ɲàmàà dààⁿ* 'distant house'
sùwɔ̀ 'sheep' + *bílá-ná* 'alive' → *sùwɔ̀ bìlà-nà* 'living sheep'

ii. adjective has /L/ melody, sequence appears as L-L

sùwɔ̀ 'sheep' + *bɔ̀rɔ̀ⁿ* 'big' → *sùwɔ̀ bɔ̀rɔ̀ⁿ* 'big sheep'
kɔ̀bɔ́ 'knee' + *bɔ̀rɔ̀ⁿ* 'big' → *kɔ̀bɔ̀ bɔ̀rɔ̀ⁿ* 'big knee'
ɲàmáà 'house' + *bɔ̀rɔ̀ⁿ* 'big' → *ɲàmàà bɔ̀rɔ̀ⁿ* 'big house'
ɲàmáà 'house' + *pìⁿjɛ̀-nà* 'black' → *ɲàmàà pìⁿjɛ̀-nà* 'black house'

b. initial is [LEFT.HIGH], from melody /H/ or /HL/

i. adjective has /H/ melody, sequence appears as H-H

súwó 'goat' + *kɛ́ɛ́wú* 'male' → *súwó kɛ́ɛ́wú* 'billy-goat'
dáábà 'animal' + *kɛ́ɛ́wú* 'male' → *dáábá kɛ́ɛ́wú* 'male animal'
dáábà 'animal' + *bílá-ná* 'alive' → *dáábá bílá-ná* 'living animal'

ii. adjective has /L/ melody, sequence appears as H-H

súwó 'goat' + *bɔ̀rɔ̀ⁿ* 'big' → *súwó bórɔ́ⁿ* 'big goat'
dáábà 'animal' + *bɔ̀rɔ̀ⁿ* 'big' → *dáábá bórɔ́ⁿ* 'big animal'
dáábà 'animal' + *pìjⁿɛ̀-nà* 'black' → *dáábá píjⁿɛ́-ná* 'black animal'

Because the opposition between /H/ and /L/ melodies is neutralized in finals, one might argue that [LEVEL] finals erase the lexical tones, creating a tonal vacuum that is then filled by spreading the overlaid tone from the initial onto the final.

(9) illustrates Sorogaama N-Adj combinations whose final is of [CONTOUR] melodic superclass (attested contour melodies for adjectives are /HL/ and /LHL/). The final takes {H*L} overlay, which is particularly clear with 'dry' whose melody is /LHL/. For participles, the tone break must precede the stem-suffix boundary, hence *nɔ́gɔ̀-nà* and *wúwò-nà*.

(9) a. initial is [LEFT.LOW], from melody /L/, /LH/, or /LHL/
adjective has [CONTOUR] melody, sequence appears as L-H*L

sùwɔ̀ 'sheep' + *wáárà(w)ⁿ* 'smart' → *sùwɔ̀ wáárà(w)ⁿ* 'smart sheep'
sàbá 'chicken' + *nɔ́gɔ̀-nà* 'dirty' → *sàbà nɔ́gɔ̀-nà* 'dirty chicken'
pàpórò 'fishtrap' + *wùwó-nà* 'dry' → *pàpòrò wúwò-nà* 'dry fishtrap'

b. initial is [LEFT.HIGH], from melody /H/ or /HL/
adjective has [CONTOUR] melody, sequence appears as H-H*L

súwó 'goat' + *wáárà(w)ⁿ* 'smart' → *súwó wáárà(w)ⁿ* 'smart goat'
kóŋgòrò 'dog' + *nɔ́gɔ̀-nà* 'dirty' → *kóŋgóró nɔ́gɔ̀-nà* 'dirty dog'
kóŋgòrò 'dog' + *wùwó-nà* 'dry' → *kóŋgóró wúwò-nà* 'dry dog'

Takeaways from Sorogaama: N-N and N-Adj have identical tonal patterns; N-Adj1-Adj2 is organized as two prosodic words [N-Adj1] and Adj2; initials take overlays that effectively spread the leftmost tone to the boundary, and onward to the end of the final if the latter is [LEVEL]; finals of type [CONTOUR] are associated with a fixed overlay {H*L}.

6. Cliffs: initials (leftmost tone), finals (raising of L)

The handful of villages that speak Cliffs are located at the mouth of the valley cutting into the plateau that houses the villages that speak the language isolate Bangime, which has three tone levels (Heath & Hantgan 2018). This may explain in part why Cliffs has retained three lexical tone levels (H, M, L),[10] whereas Sorogaama (of Djenné) and Jenaama of Djambakourou have two lexical tone levels.

Tone-markings for Cliffs in this paper are those that occur medially in prosodic phrases, as opposed to prepausal forms where word-final H-tones drop to M.

The three-level system allows a wider range of melodies in simple Cliffs stems (10) as compared with Sorogaama. In the nonmonotonal (contour) melodies, it is notable that H is always the rightmost tone element, while M is never the rightmost tone element. In other words, H and M are in complementary distribution except in monotonal /H/ and /M/.

(10)

melody	example	gloss
a. noun melodies		
/H/	*kúŋgóló*	'dog'
/M/	*ɟɪ̄ɪ̄*	'water'

[10] The H tone in Cliffs has some distributional attributes of superhigh (SH) in verbs, but not in nouns. Such hybrids make me skeptical of coding languages as either {H M L} or {SH H L}. Among other unique features of Cliffs is the high back unrounded vowel *ɯ*, which occurs in no other language of the zone.

/L/	*kʊ̀jgʊ̀*	‘blacksmith’
/LH/	*màlìfá*	‘rifle’
/ML/	*sūkɔ̄rɔ̀*	‘sugar’
/LML/	*jàmbāà*	‘house’
/MLH/	*mākàrí*	‘macari (spice)’

b. ungrammatical (nonexistent) noun melodies

#/HL/
#/HM/
#/LM/

The morphotonology of N-N compounds is presented in (11). It will be shown below that this model is also compatible with N-Adj data, where however it can be difficult to determine the precise lexical melody of the adjective.

(11) Morphotonological processes in N-N (Cliffs)

a. classify the initial as [LEFT.NONLOW] if the leftmost melodic element is H or M;
[LEFT.LOW] if its leftmost melodic element is L;

b. associate [LEFT.NONLOW] initials with {M} overlay;
[LEFT.LOW] initials with {L} overlay;

c. classify the final as [LEFT.LOW] if its melody is /L/, /LH/, or /LML/

d. associate [LEFT.LOW] finals with {M} overlay;

(e. do nothing to other finals.)

The computed Cliffs melodic superclass [LEFT.NONLOW], reflecting the merger of leftmost H into leftmost M, is homologous to Sorogaama [LEFT.HIGH]. The overlay for [LEFT.NONLOW] is {M} in Cliffs. Initials with {M} overlay are then subject to the tone-polarization process M#H-to-L#H, omitted in (11) since polarization is a predictable low-level process.

Finals with melodies that begin with a nonlow tone (/H/, /M/, /ML/, /MLH/) are preserved without tonal change as finals. By contrast, finals whose melody is /L/ or /LH/ merge as the melodic superclass [LEFT.LOW] (11c-d) and are associated with {M} overlay.

The {M} overlay for [LEFT.NONLOW] initials from (11b) above is observed most clearly in *kēgū-*, *dēē-*, and *mākārī-* in (12.a.i). The M-tones drop to L before an H-tone due to predictable polarization in (12.a.ii). The {L} overlay for [LEFT.LOW] initials is observed most clearly in *ɲɛ̀lɛ́w^{n}* → *ɲɛ̀lɛ̀^{n}-* in (12b.ii). As for the finals, the only tonal change is the {M} overlay for [LEFT.LOW] finals, most clearly in *-dɛ̄gɛ̄* and *-cīj̄ɛ̄* from *dɛ̀gɛ̀* ‘pain’ and *cìjɛ̀* ‘field’ in (12.a.iii and b.ii)

(12) a. initial is [LEFT.NONLOW], from melody /H/, /M/, /ML/, or /MLH/

i. final retains its melody /M/, /ML/, /MLH/)

kégú 'cream of millet' + *dīgɛ̄* 'eat.VblN' → *kēgū-dīgɛ̄* 'eating cream'
tēē 'meat' + *dīgɛ̄* 'eat.VblN' → *tēē-dīgɛ̄* 'eating meat'
mākàrí 'macari (spice) + *dīgɛ̄* 'eat.VblN' → *mākārī-dīgɛ̄* 'eating macari'
pīīⁿ 'millet' + *sɛ̄gɛ̀* 'pound.VblN' → *pīīⁿ-sɛ̄gɛ̀* 'pounding millet'
déé 'cotton' + *cìjè* 'field' *dēē-ɲ̄-cījē* 'cotton field'

ii. final retains its melody (/H/), triggers M#H-to-L#H on the initial

sɔ̄ŋɔ̄ⁿ 'the bush' + *kúŋgúló* 'dog' → *sɔ̀ŋɔ̀ŋ-kúŋgúló* 'jackal'

iii. final is [LEFT.LOW], subject to {M} overlay

pīīⁿ 'millet' + *cìjè* 'field' → *pīīɲ-cījē* 'millet field'
ɲīīⁿ 'tooth' + *dègɛ̀* 'pain' → *ɲīīn-dēgɛ̄* 'toothache'

b. initial is [LEFT.LOW], from melody /L/, /LH/, or /LML/

i. final retains its melody (/M/, /ML/, /MLH/, /H/)

kùwò 'excrement' + *sūūⁿ* 'fly' → *kùwò-sūū* 'blowfly'
nɔ̀gù 'village' + *mīīɾù* 'leader' → *nɔ̀gù-mīīɾù* 'village chief'
nàà 'cow' + *būwɔ̀-jà* 'herder' → *nàà-m-būwɔ̀-jà* 'cowherd'

ii. final is [LEFT.LOW], raised to {M}

kɔ̀ɾɔ̀ 'back' + *dègɛ̀* 'pain' → *kɔ̀ɾɔ̀-n-dēgɛ̄* 'back pain'
ɲèléwⁿ 'tongue' + *dègɛ̀* 'pain' → *ɲèlèn-dēgɛ̄* 'tongue pain'
tùbáábú 'European' + *sɔ̀ɾdāāsì* 'soldier' *tùbàà-ⁿ-sɔ̄ɾdāāsī* 'white soldier'

There is also a minority compound type whose finals (of various melodies) are subject to {H} overlay, unlike the case in the productive compound pattern described above which involves only partial raising of L by {M} overlay. There is a general semantic profile of the minority {H}-final pattern: the final denotes a class of entities, and the initial specifies it more narrowly by habitat, function, or ethnicity (13). Initials that would otherwise be expected to be M-toned drop to L-toned before the H-toned final by the polarization process M#H-to-L#L.

(13)

noun	gloss	as final	example
sīī	'type, clan'	*-síí*	*sìnɔ̀gɔ̀-ⁿ-síí-jè* 'Sundago clans' (plural)
kùmbùrù	'bug'	*-kúmbúrú*	*[kùwò-cjɛ̀ŋ]-kúmbúrú* 'dung-carrying beetle'
sàbá	'chicken'	*-sábá*	*[ɟìì-nìŋì]-sábá* 'waterfowl'

N-Adj combinations seem to follow the tonal patterns of N-N compounds. However, it can be difficult to determine the melodies of modifying adjectives. *bánú* 'massive' is clearly /H/-melodic. Other morphologically simple modifying adjectives

present as M-toned, which could point to either /M/ or /L/ melody. Suffixed adjectives and participles are M-toned (*pēlū-gū* 'lightweight'*, pān-nā* 'full') or ML-toned (*mījɛ̀-gù* 'thin', *bīllà-nà* 'narrow')

Some basic modifying adjectives have an associated stative predicative form. However, the modifying and predicative forms often differ segmentally, making it doubtful that they can be analysed as the same lexical item. For Sorogaama, as shown above, it is possible to get around this dilemma, since N-Adj1-Adj2 is divided into two prosodic words as [N-Adj1] plus Adj2, where Adj2 surfaces in its melody. By contrast, in Cliffs, N-Adj1-Adj2 is phrased as a compound [N-Adj1]-Adj2, with Adj2 raised by {H} overlay in the fashion of the minority N-N compound pattern illustrated in (13) above. For example, *jàmbàà pīī*^{n} 'black house' and *jàmbàà būlōw*^{n} 'big house' both show M-toned modifying adjectives. The two can be combined as either *jàmbàà bùlòm píí*^{n} 'black big house' or *jàmbàà pììm búlów*^{n} 'big black house'. Here the H-toned Adj2 triggers polarization (M#H-to-L#H) on the preceding Adj1. The upshot is that M-toned modifying adjectives like *pīī*^{n} 'black' and *būlōw*^{n} 'big' are indeterminate as to /M/ versus /L/ melodies. With this proviso, they are here tentatively labeled as /M/. Combinations of N-Adj in Cliffs follow the formulae in (14).

(14)	noun	adjective	N-Adj	
a.	/H/	/H/	M-H	(→ L-H by polarization)
	/M/	/H/	M-H	(→ L-H by polarization)
b.	/L/	/H/	L-H	
c.	/H/	/M/	M-M	
	/M/	/M/	M-M	
d.	/L/	/M/	L-M	
e.	/H/	/ML/	M-ML	
	/M/	/ML/	M-ML	
f.	/L/	/ML/	L-ML	

These outputs are consistent with the productive formulae for N-N formalized in (11) above. Specifically, /H/-melodic initials merge down to M-tone, finals cannot be all-L-toned, and H-toned finals trigger low-level polarization M#H-to-L#H. Examples are in (15a-f), which illustrate (14a-f) above in order.

(15)a. *kúŋgóló + bánú* → *kùŋgòlò bánú* 'big dog'
sūgō + bánú → *sùgò bánú* 'big goat'

b. *sùwɔ̀ + bánú* → *sùwɔ̀ bánú* 'big sheep'

c.	*kúŋgóló + tōj*	→	*kūŋgōlō tōj* ‘new dog’
	kúŋgóló + kùrù^{n}	→	*kūŋgōlō kūrū^{n}* ‘short dog’
	sūgō + tōj	→	*sūgō tōj* ‘new goat’
	sūgō + kūrū^{n}	→	*sūgō kūrū^{n}* ‘short goat’
d.	*sùwɔ̀ + tōj*	→	*sùwɔ̀ tōj* ‘new sheep’
	sùwɔ̀ + kūrū^{n}	→	*sùwɔ̀ kūrū^{n}* ‘short sheep’
e.	*kúŋgóló + mījɛ̀-gù*	→	*kūŋgōlō mījɛ̀-gù* ‘small dog’
	sūgō + mījɛ̀-gù	→	*sūgō mījɛ̀-gù* ‘small goat’
f.	*sùwɔ̀ + mījɛ̀-gù*	→	*sùwɔ̀ mījɛ̀-gù* ‘small sheep’

Takeaways from Cliffs: N-N and N-Adj have identical tonal patterns; /H/-melodic initials merge down with melodies beginning with M to form the [LEFT.NONLOW] superclass and take {M} overlay; finals of [LEFT.LOW] superclass take {M} overlay while other finals are unchanged; a minority pattern for N-N compounds, and the regular output for Adj2 in N-Adj1-Adj2, has {H} overlay on the final; M-toned stems are subject to the low-level polarization process M#H-to-L#H.

7. Kelenga

As mentioned earlier, Kelenga is thought to constitute one genetic branch of Bozo, sister to the branch containing all other Bozo languages. It has two lexical tone levels, H and L. It makes phonologically significant use of three surface tones (H, M, and L), but this issue is not directly relevant to N-N and N-Adj combinations.

Simple Kelenga nouns can have melodies /H/, /L/, /HL/, /LHL/, /HLHL/, /LHLHL/, and (in one case) /HLHLHL/. No nominal melody consists of or ends in /…LH/. In other words, /H/ is the only melody that ends in H-tone; all melodies that contain an L-tone end in an L-tone.[11]

The productive tonal patterns for N-N and N-Adj are formalized in (16). A minority pattern of tonal form L-HL is not discussed here.

(16) Morphotonological processes in N-N and N-Adj (Kelenga)
a. classify the initial as [ALL.HIGH] if its melody is /H/;
[NOT.ALL.HIGH] if its melody contains an L;
b. associate all initials with {H} overlay;

[11] The majority of Kelenga nouns and adjectives, including those featured in this section, end in vowels. A minority end in a nasal element that is realized as velar nasal *ŋ* before a suffixal vowel, and as nasalization of the stem-final vowel otherwise. An example is ‘millet’ in (17a). The final nasal element has minor tonal effects on the stem-final syllable and (if present) the suffixal syllable. These effects are covered in the full reference grammar but can be disregarded here.

c. associate finals with {H} overlay if the initial is [ALL.HIGH]
{H*L} overlay (monosyllabic L) if initial is [NOT.ALL.HIGH]

N-N and N-Adj combinations have only two outputs: H-H (all-H), and H-H*L ending in a single L-toned syllable (or monosyllabic mora). The choice depends solely on whether the melody of the initial contains an L-tone. The melody of the final is erased without trace. In effect, the melody of the initial is **locally** erased since all initials surface as H-toned, but the presence of an L-tone in the melody of the initial is "remembered" and determines the tone of the rightmost syllable of the final.

Examples of Kelenga N-N compounds follow. The initials are uniformly H-toned. The final ends in one L-toned syllable, preceded by from zero to several H-toned syllables, if the melody of the initial contains an L-tone (17a). Otherwise the final and therefore the entire compound is H-toned (17b). The parenthesized vocalic suffix (or extension) following short final vowels, characteristic of Kelenga NPs, can be disregarded here as it simply continues the tone of its syllable.

(17) melody initial final compound

a. initial contains a L-tone; sequence is H-H*L with one L-toned syllable/mora

L	*hɔ̀ɔ̀* 'house'	*tígí-(í)* 'owner'	*hɔ́ɔ́-tígì(-ì)* 'house owner'
HL	*gáálè(-è)* 'mind'	*tígí-(í)* 'owner'	*gáálé-tígì(-ì)* 'intelligent one'
LHL	*bìtígì(-ì)* 'store'	*tígí-(í)* 'owner'	*bítígí-tígì(-ì)* 'storekeeper'
L	*jòŋ(-ɔ̂)* 'millet'	*fíè* 'seed, grain'	*jó^{n}-fíè* 'millet grain'

b. initial contains only H-tone(s); entire sequence is H-toned

H	*sógó(-ó)* 'goat'	*tígí(-í)* 'owner'	*sógó-tígí(-í* 'goat owner'
H	*ɟírí(-í)* 'tree'	*tígí-(í)* 'owner'	*ɟírí-tígí(-í* 'tree owner'
H	*zárá(-á)* 'watermelon'	*fíè* 'seed, grain'	*zárá-fíé* 'watermelon seed'

N-Adj sequences have the same tonal patterns. (18) illustrates with *fɛŋu* 'light (weight)' and *mɛɛ* 'good'. Whether the melody of the adjective can be determined on other grounds is irrelevant since the melody of the modifying adjective (like that of nominal compound finals) is erased.

(18) melody noun final N-Adj

a. initial has /H/ melody

H	*sógó(-ó)* 'goat'	*fɛŋu* 'light'	*sógó fɛ́ŋú(-ú)* 'light goat'
H	*ɟírí(-í)* 'tree'	*fɛŋu* 'light'	*ɟírí fɛ́ŋú(-ú)* 'light tree'
H	*ɟírí(-í)* 'tree'	*mɛɛ* 'good'	*ɟírí mɛ́ɛ́* 'good tree'

b. initial has any other melody

L	*hɔ̀ɔ̀* 'house'	*fɛŋu* 'light'	*hɔ́ɔ́ fɛ́ŋù(-ù)* 'light house'
HL	*gáálè(-è)* 'mind'	*fɛŋu* 'light'	*gáálé fɛ́ŋù(-ù)* 'light mind'
LHL	*bìtígì(-ì)* 'store'	*fɛŋu* 'light'	*bítígí fɛ́ŋù(-ù)* 'light store'
LHL	*bìtígì(-ì)* 'store'	*mɛɛ* 'good'	*bítígí mɛ̀ɛ̀* 'good store'

Takeaways for Kelenga: N-N and N-Adj have identical tonal patterns; the melody of the final is suppressed without trace; if the melody of the initial contains an L-tone, the combination is realized as H-H*L with one final L-toned syllable or monosyllabic mora; if the melody of the initial is /H/, the combination is all-H-toned.

8. Tigemaxo

Tigemaxo has three lexical tone levels, like Cliffs but unlike Sorogaama and Kelenga. Comparative data show that Proto-Bozo */L/ melody became Tigemaxo /HL/, and that Proto-Bozo */HL/ became Tigemaxo /HM/. As a result, Tigemaxo has no synchronic /L/ melody.

Monotonal melodies of nouns are /H/ for stems of any size, and /M/ for short (mono- and bisyllabic) stems. See just below for alternative analyses of /H/ and /M/ melodies. Bitonal melodies for nouns are /HL/, /HM/, and for a handful of (more or less diphthongal) monosyllabics also /LH/. Multitonal melodies for nouns are /HLH/, /HLHL/, /HLHM/, /HLHLHM/, and rarely /LHL/. All melodies containing M-tone end in M. There are also some **hybrid** melodies of the type /(L)HL(…)/ whose initial L is overt in certain non-clause-initial positions.

A distinctive characteristic of Tigemaxo is that when a clause (more accurately, a prosodic phrase) begins with two or more adjacent H-toned words or particles after a pause, they lock together into a single **H-terrace**, i.e. an H-toned string pronounced like a single word, with no phonetic marking of word boundaries.[12] Words consisting of uncompounded /H/-melodic stems surface as H-toned only when they are part of an H-terrace. Elsewhere, i.e. noninitially in a prosodic phrase when the preceding string includes an L-tone, such words drop to L-toned. The only constant for these stems is that they are always level-toned, whether H or L. One could therefore reinterpret /H/ melody as /level/ melody, with H or L tone assigned to them secondarily based on whether they are part of an H-terrace.

A potential factual argument against analysing this melody as /level/ rather than /H/ is that there is another seemingly level-toned melody, namely /M/. However, it is

[12] H-terraces can cut across morphosyntactic phrasal boundaries. Standard definitions of prosodic word and prosodic/phonological phrase, already problematic for Bozo N-N and N-Adj combinations documented in this paper, are unhelpful in connection with Tigemaxo H-terraces. These issues will be dealt with in another paper.

doubtful that /M/ melody is structurally level-toned. The relevant stems, all of which are mono- or bisyllabic, appear with level M-tone only when immediately prepausal. Except in citation, nouns and adjectives are rarely in immediate prepausal position, since constituent order is S-O-V-X and since NPs in the postverbal X are generally part of postpositional phrases. In nonfinal position within prosodic phrases, /M/-melodic stems surface either as HL-toned or as LH-toned, depending on the specific grammatical context. For example, *ɟāwā* 'guinea-fowl' is heard with M-tones only in isolation or otherwise prepausally. In all other positions it is heard as *ɟáwà* or as *ɟàwá*. If such stems are analysed as lexically contour-toned rather than level-M toned, there would be no objection to reanalysing /H/ melody as the only /level/ melody.

The fact that this reanalysis of /M/ and /H/ melodies may be technically possible does not guarantee that it is cognitively correct. Since /H/-melodic stems are consistently H-toned in isolation (citation form), postpausally, and in H-terraces, while their L-toned form occurs only medially when the preceding string contains at least one L-tone, there is a distributional asymmetry that favors sticking with /H/ as the melody and treating the L-toned form as derived by a lowering process. /M/ and /H/ melodies are therefore recognized here, but with caveats.

N-N compounds will be considered first since their tonal patterning is clearer than that of N-Adj. The summary is (19). [BELL] means 'bell-shaped' (campanulate if you prefer).

(19) Morphotonological processes in N-N compounds (Tigemaxo)

a. classify the initial as [NONLOW] if its melody is /H/ or /HM/;
[LOW] if it is /M/ or it contains an L-tone;

b. classify the final as [HIGH] if its melody is /H/;
[MIX] if it is /M/, /HM/, /HL/, /HLH/, or /LH/;
[BELL] if the melody contains LHL or LHM;

c. associate all initials with {H} overlay;

d. if the final is [HIGH], apply {L} overlay after [LOW] initial;
[MIX], apply {HM} after [NONLOW], {LH} after [LOW]
[BELL], apply {H…} after [NONLOW], {L…} after [LOW].

In this system, initials are grouped into two melodic superclasses as in the other languages. Finals are more differentiated, and [BELL] finals preserve some of the later tones and tone breaks of the input melody (see below). Another notable feature of this system is that /HM/ merges with /H/ as initial, but it merges with /M/ and /HL/ as final (leaving /H/ isolated).

Exemplification follows, using the order of finals in (19d) above. (20) illustrates [HIGH] finals, those of /H/ melody. Recall that the consistent feature of /H/-melodic stems is that they always surface as level-toned (all-H or all-L).

(20)	initial	final	compound
a. [NONLOW] initial			
	ɲúɔ́ 'fish (any)'	*ʃwáá^{n}*	*ɲúɔ́-ʃwáá* 'fish market'
	múɔ́tī 'Mopti (city)'	*ʃwáá^{n}*	*múɔ́tí-ʃwáá* 'Mopti market'
	lɔ́j 'construction'	*tɔ́lɔ́*	*lɔ́j-tɔ́lɔ́* 'moist earth for walls'
b. [LOW] initial			
	tínímù 'Ténenkou (town)'	*ʃwáá^{n}*	*tínímú-ʃwàà^{n}* 'Ténenkou market'
	málìfá 'rifle'	*ʃwáá^{n}*	*málífá-ʃwàà^{n}* 'rifle market'
	bíɛ̀wá 'brick'	*tɔ́lɔ́*	*bíɛ́wá-tɔ̀lɔ̀* 'moist earth for bricks'

The tonal forms in (20) are citation (or clause-initial) pronunciations. When all-H compounds like *ɲúɔ́-ʃwáá* (20a) are clause-medial and not part of a clause-initial H-terrace, they drop to L-toned (*ɲùɔ̀-ʃwàà*), just as simple /H/-melodic nouns do. Conversely, H-L compounds like *tínímú-ʃwàà^{n}* behave like simple /HL/-melodic nouns and retain their tones anywhere in the clause.[13]

[MIX] finals are those of melodies /HM/, /HL/, /M/, /HLH/, and /LH/. They are probably all historically bitonal. For example, /HLH/ stems reflect multimoraic */LH/ stems, and as noted above /M/ is arguably contour-toned structurally. As compound finals, all of these are HM-toned (21a) or LH-toned (21b), depending on the initial, in either case with right-biased tone breaks as shown by 'granary' and 'rifle/musket'.

(21)	initial	final	compound	
a. [NONLOW] initial				
	tééŋɛ̄ 'waterjar'	*fɛ́rɛ̄*	*tééŋé-fɛ́rɛ̄*	'waterjar shard'
	ɟɔ́ɔ́lɔ̄ 'blood'	*gɔ́wɔ̀*	*ɟɔ́ɔ́lɔ́-gɔ́wɔ̄*	'blood disorder'
	máá^{n}jɔ́^{n} 'maize'	*ɟígínɛ̀*	*máá^{n}jɔ́ɲ-ɟígínɛ̀*	'maize granary'
	cíé 'oil'	*tūrɔ̄ɔ̄*	*cíé-túrɔ̄ɔ̄*	'remainder of oil'
	fóónó 'the bush'	*ʃìé*	*[fóónó-ɟ]-ʃíē*	'wild horse'
	ɟírí 'tree'	*málìfá*	*[ɟírí]-málífā*	'wooden rifle'
b. [LOW] initial				
	xáá^{n}jɔ̀^{n} 'calabash'	*fɛ́rɛ̄*	*xáá^{n}jɔ́^{n}-fɛ̀rɛ́*	'calabash shard'

[13] The initial H of an HL-toned stem or compound is lowered a notch to M when "M-terraced" by a preceding clause-initial 3Sg *ā* or 3Pl *jē*. The resulting ML-toned form preserves the original tone break.

tɔ̄lɔ̄ ‘liver’		*gɔ́wɔ̀*	*tɔ́lɔ́-gɔ̀wɔ́* ‘liver disease’
xɔ́ndɔ̀lɔ̀ ‘sorghum’		*ɟígínɛ̀*	*xɔ́ndɔ́lɔ́-ɟìgìnɛ́* ‘sorghum granary’
mááfɛ̀ ‘sauce’		*tūrɔ̄ɔ̄*	*mááfɛ́-tùrɔ́ɔ́* ‘remainder of sauce’
nɔ́ɔ̀ ‘village’		*ʃìé*	*[nɔ́ɔ́-níŋíiⁿ]-ʃìé* ‘domestic horse’[14]
ɟáá-ŋà ‘resident of Dia’		*málìfá*	*[ɟáá-ŋá]-màlìfá* ‘traditional musket’

[BELL] finals have at least three tone elements, and their melodies contains LHL or LHM, i.e. a bell-shaped tone sequence. The melodies are /LHL/, /LHLH/, /LHM/, /HLHL/, /HLHM/, and hybrid melodies (with initial L appearing in certain contexts) /(L)HL/, /(L)HLH/, /(L)HLHL/, /(L)HM/, and /(L)HLHM/. All but /(L)HL/ are uncommon even as simple noun stems, never mind as compound finals. As finals, they have an H-initial form after [NONLOW] initials, and an L-initial form after [LOW] initials. In other words, for these complex melodies only the left edge is affected by tonal ablaut. The medial tone peak (the H in LHL or LHM) blocks any further tonal ablaut modification, preserving all tone elements and tone-break locations to its right. With this restriction, tone breaks are otherwise right-biased. Schematic formulae for some of these melodies are in (22).

(22)	melody	final after [NONLOW]	final after [LOW]
a.	/LHL/	HL	LHL
	/LHLH/	HLH	LHLH
b.	/HLHL/	HLHL	LHL
	/HLHM/	HLHM	LHM
c.	hybrid /(L)HL/	HL	LHL
	hybrid /(L)HLHL/	HLHL	LHLHL
	hybrid /(L)HLHM/	HLHM	LHLHM

If the melodies in the left column are correct, the tonal form of the finals can be produced by adding H to the left edge in the middle column and adding L to the left edge in the right column. An added H merges with an existing initial H, and an added L merges with an existing initial L. In the cases of /LHL/ and /LHLH/ melodies, an added initial H would overload the initial L-toned TBU, so an <HLH> syllable compresses to H, and <HL> on a syllabic nasal reduces to H (22a). In the hybrid L-initial melodies, the noun already has H-initial and L-initial forms as a simple noun,

[14] The initial *[nɔ́ɔ́-níŋíiⁿ]-* is based on the postpositional phrase *nɔ́ɔ̀ níŋīī(ⁿ)* ‘in(side) (the) village’. In such PP-N compounds, the melody of the noun is what feeds into tonal ablaut, while that of the postposition is disregarded.

the choice depending on position in the clause, so these forms can be directly appropriated as the two variants in compounds.

Examples of compounds with [BELL] finals are in (23). Several of them are semantically improbable, but elicitable. *mìínì* is /LHL/, *ǹtántààré* is /LHLH/, *ʃúúkòláāⁿ* is /HLHM/, *ɲáálíkòròndóò* is /HLHL/, *ɟúgúnì* (~ *ɟùgúnì*) is /(L)HL/, *ɲímínìkálà* (~ *ɲìmínìkálà*) is /(L)HLHL/, and *tábátíjɛ̀dáā* (~ *tàbàtíjɛ̀dáā*) is /(L)HLHM/.

(23) initial final compound

a. [NONLOW] initial, final begins with H

léwé 'sew.VblN'	*mìínì*	*léwé-míínì* 'sewing needle'
fóónó 'the bush'	*ǹtántààré*	*[fóónó-ý]-ńtántààré* 'bush spider'
fóónó 'the bush'	*ʃúúkòláāⁿ*	*[fóónó-j]-ʃúúkòláāⁿ* 'wild basil'
fóónó 'the bush'	*ɲáálíkòròndóò*	*[fóónó-j]-ɲáálíkòròndóò* 'wild chameleon'
fóónó 'the bush'	*ɟúgúnì*	*[fóónó-j]-ɟúgúnì* 'wild hedgehog'
fóónó 'the bush'	*ɲímínìkálà*	*[fóónó-j]-ɲímínìkálà* 'wild sugar cane'
fóónó 'the bush'	*tábátíjɛ̀dáā*	*[fóónó-j]-tábátíjɛ̀dáā* 'wild water lettuce'

b. [NONLOW] initial, final begins with L

súgɛ̀ 'embroidery'	*mìínì*	*súgɛ́-mìínì* 'broidery needle'
nɔ́ɔ̀ 'village'	*ǹtántààré*	*[nɔ́ɔ̀-ɲíŋííⁿ]-ǹtántààré* 'village spider'
nɔ́ɔ̀ 'village'	*ʃúúkòláāⁿ*	*[nɔ́ɔ̀-ɲíŋííⁿ]-ʃùúkòláāⁿ* 'domestic basil'
nɔ́ɔ̀ 'village'	*ɲáálíkòròndóò*	*[nɔ́ɔ̀-níŋííⁿ]-ɲààĺíkòròndóò* 'village chameleon'
nɔ́ɔ̀ 'village'	*ɟúgúnì*	*[nɔ́ɔ̀-níŋííɲ]-ɟùgúnì* 'village hedgehog'
nɔ́ɔ̀ 'village'	*ɲímínìkálà*	*[nɔ́ɔ̀-níŋííⁿ]-ɲìmínìkálà* 'domestic sugar cane'
nɔ́ɔ̀ 'village'	*tábátíjɛ̀dáā*	*[nɔ́ɔ̀-níŋíín]-tàbàtíjɛ̀dáā* 'village water lettuce'

N-Adj in Tigemaxo can now be considered. The treatment of the noun in N-Adj is compatible with that of the initial in N-N compounds, though only a few adjectival melodies are attested. The noun takes H-toned form as in compound initials. /H/ and /HM/ initials are [NONLOW] while nouns of other melodies are [LOW], with the expected effect on adjectival tones.

Most underived modifying adjectives behave tonally like /H/-melodic compound finals. The few others are /HM/- or hybrid /(L)HL/-melodic. This inventory is sufficient for adjectives to match the [HIGH], [MIX], and [BELL] superclasses of compound finals. In (24), isolation forms of the adjectives are not shown since they do not exist.[15]

[15] Adjectives do occur in predicates but often in different segmental forms. Deverbal participles (suffix *-na*) can also modify nouns, and increase the inventory of /H/ and especially hybrid /(L)HL/ modifiers. Their lexical melodies can be determined from participial predicates ('be' plus participle). Participles are not illustrated here.

The nouns are *xálú* 'man' ([NONLOW]) and *jáálù* 'woman' ([LOW]). As with compounds, H-H toned N-Adj combinations, like *xálú ɲíŋáá* in (24a), drop to all-L-toned clause-medially when not part of an H-terrace.

(24) adjective N-Adj independent form of noun

a. /H/-melodic adjective

'nasty'	*xálú ɲíŋáá* 'nasty man'	*xálú*
	jáálú ɲìŋàà 'nasty woman'	*jáálù*
'old'	*xálú xɔ́nɔ́mɔ́nɔ́* 'old man'	*xálú*
	jáálú xɔ̀nɔ̀mɔ̀nɔ̀ 'old woman'	*jáálù*

b. /HM/-melodic adjective

'big'	*xálú xólō*	'big man'	*xálú*
	jáálú xòló	'big woman'	*jáálù*
'feeble'	*xálú ɟáásī*	'feeble man'	*xálú*
	jáálú ɟààsí	'feeble woman'	*jáálù*

c. hybrid /(L)HL/-melodic adjective

'rotten'	*xálú fúólò*	'rotten man'	*xálú*
	jáálú fùólò	'rotten woman'	*jáálù*
'serious'	*xálú ʃúɔ́wéɛ̀ⁿ*	'serious man'	*xálú*
	jáálú ʃùɔ̀wéɛ̀ⁿ	'serious woman'	*jáálù*

Takeaways for Tigemaxo: all compound initials are H-toned, but a distinction between [NONLOW] (/H/ or /HM/) and [LOW] (other melodies) initials affects the tone of the final; the tonal treatment of compound finals is more complex than in the other Bozo languages, involving at least three melodic superclasses; tonally complex finals that include bell-shaped strings preserve melodic tones and tone-break locations to the right of the peak; N-Adj behaves tonally like N-N so far as can be determined.

9. Soninke parallels

Soninke is a major Mande language, with millions of speakers in a dialect chain found most prominently in western Mali and in neighboring Mauritania, Senegal and Gambia. Soninke is considered to be a genetic sister to the Bozo group, both being part of Western Mande (Kastenholz 1997; Vydrin 2009).

The tone system of Soninke has been described by Rialland (1990) and Creissels (2015; 2018). Creissels' "non-autonomous form" of nouns, equivalent to the initial in N-N and N-Adj, is characterized by "a reduction of the tonal melodies of nominal lexemes to their first element, resulting in an all-H or all-L tone pattern" (2015: 9). The Soninke treatment of initials is therefore similar to that in Sorogaama and Cliffs. It is possible that this treatment goes back to the protolanguage of which both Soninke and

Bozo are daughters. If so, Kelenga and Tigemaxo have innovated in generalizing all-H-toned form to all initials.

For tonal patterns of N-N and N-Adj in more distantly related Mande languages, see Green & Konoshenko (2022) and references there.

10. Bangime DEF-N and POSS-N

A more extreme case of input-to-output mismatch (anti-faithfulness, so to speak) is that of post-determiner nouns (i.e. nouns following a possessor or the definite morpheme) in the nearby but unrelated Bangime language, where overlays systematically invert the melody (e.g. /L…/ → {M} and /H…/ or /M…/ → {L}). Data in this section are from Heath & Hantgan (2018). The determiners that can precede nouns are possessors of any type (NP or pronominal), along with definite *ā*. (Demonstratives 'this' and 'that' follow the noun and are not relevant here.)

It is necessary to begin by factoring out combinations where definite *ā* creates an M-terrace by projecting its M-tone rightward to the end of the noun stem. This happens when definite *ā* is followed by singular nouns of some, but not all, melodies. Nominal melodies are /H/, /HL/, /L/, /LH/, /M/, and /ML/. One might think that M-terrace formation would be automatic with nouns that already begin with M-tone, and would be difficult with other melodies, but the opposite is true: M-terrace formation happens only when definite *ā* is followed by singular nouns whose melodies begin with H- or L-tone. Thus *párí* 'arrow', definite *ā pārī*, and *bùrⁿà* 'stick', definite *ā būrⁿā*.[16]

Nouns (singular or plural) functioning as possessums, preceded by either NP or pronominal possessors, are not subject to M-terrace formation. The same is true of plural nouns of all melodies, and singular nouns of M-initial melodies, when preceded by definite *ā*. The great majority of these non-M-terraced nouns are subject to a dramatic tonal ablaut process schematized as (25).[17]

(25) Morphotonological processes in post-determiner nouns (Bangime)

a. classify the noun as [NONLOW] if its melody begins with H- or M-tone;
[LOW] if its melody begins with L-tone;

[16] Though superficially similar, *a¯pārī* and *ā būrⁿā* actually have structurally distinct tone patterns, brought out by adding a postnominal modifying adjective. This is because M-terrace formation occurs at different stages in the derivation in the two cases (Heath & Hantgan 2018: 74). However, that issue is not relevant to the this paper.

[17] A minority of "non-alternating" nouns do not undergo this tonal ablaut. Most of these are polysyllabic or composite nouns, including some N-N compounds and many suffixal diminutives.

b. when the noun is preceded by a determiner (definite *ā* or a possessor), and it is not a singular noun that is M-terraced after definite *ā*, associate nouns of:

[NONLOW] melodic superclass with {L} overlay;
[LOW] melodic superclass with {H} overlay.

The effect of this ablaut is the full or partial **inversion** of the melody. For example, /H/-melodic nouns surface as L-toned, and /L/-melodic nouns surface as H-toned. M-initial and H-initial melodies are merged, and only the leftmost tone of contour melodies is relevant to determining the ablaut overlay.

Some examples involving post-determiner plural nouns are in (26). Plurals are used here since they are not subject to M-terrace formation after definite *ā*. Plural suffix *-ndɛ* polarizes to the preceding tone (after the stem undergoes tonal ablaut). There are few regular /HL/-melodic stems; 'child' shows the basic tonal alternation though it loses a syllable in the plural.

(26)	melody	singular	post-determiner plural	gloss
a.	/L/	*bùrⁿà*	*búrⁿá-ndɛ̀*	'stick'
	/LH/	*ɟɛ̀ɲɟɛ́* [18]	*ɟɛ́ɲɟɛ́-ndɛ̀*	'crocodile'
b.	/M/	*dīj̄ā*	*dìjà-ndɛ́*	'village'
	/ML/	*dāndì*	*dàndì-ndɛ́*	'chili pepper'
	/H/	*párí*	*pàrì-ndɛ́*	'arrow'
	/HL/	*jáámbɛ̀*	*jàà-ndɛ́* [19]	'child'

The overlay, {H} for L-initial and {L} for non-L-initial stems, is transformative rather than simplifying. This validates the scan-classify-overlay model, in which the overlay need not be a minor modification of the input melody. Yet, as with all of the Bozo examples described above, the ablauted form of the noun does allow partial recovery of the melody. If the post-determiner form has an H-toned stem, the listener infers that the melody is L-initial, and if the post-determiner form has an L-toned stem, the listener infers that the melody is H- or M-initial. This is useful, since there are many tonal **anti-homonyms** involving high-frequency nouns, i.e. segmentally identical stems of different melodies. In (27a) the tones are inverted from singular to post-determiner plural; (27b-c) show slightly different tonal relationships. In each case, the

[18] *ʤɛ̀nʤɛ́* in the orthography used in the reference grammar.

[19] With irregular elision of the stem-final syllable before the suffix.

listener processing a post-determiner plural must reverse-engineer the ablaut to identify the stem, or else separately memorize the ablauted form as an allostem.[20]

(27)	melody	singular	post-determiner plural	gloss
a.	/L/	*bùwò*	*búwó-ndɛ̀*	‘horse’
	/H/	*búwó*	*bùwò-ndɛ́*	‘field’
b.	/L/	*tòò*	*tóó-ndɛ̀*	‘sharp point’ or ‘younger sib’
	/M/	*tōō*	*tòò-ndɛ́*	‘Duleri person’ (ethnicity)
c.	/LH/	*ɟɛ̀ŋɟɛ́*	*ɟɛ́ŋɟɛ́-ndɛ̀*	‘crocodile’
	/M/	*ɟɛ́ŋɟɛ́*	*ɟɛ̀ŋɟɛ̀-ndɛ́*	‘salt’

This Bangime ablaut is structurally parallel to the Bozo ablauts. In both Bozo and Bangime, melodies are grouped into melodic superclasses (usually two) based on a scan that looks for specific tonal characteristics. In both, a tone overlay is applied, usually on the entire stem. Bangime is instructive insofar as the tones of the overlay are completely unrelated to those of the lexical melody.

11. Conclusion

N-N compounds and N-Adj sequences have the same productive tonal patterns in each Bozo language. In both constructions, the initial and the final are separately scanned, sorted into melodic superclasses, and finally subjected to tone overlays. Bangime Det-N combinations, other than those that undergo M-terrace formation, are similarly scanned, classified, and subjected to tone overlays. In all of these cases, the fact that there are at least two melodic superclasses makes it possible for listeners to recover the lexical tones in part. This recovery is based on association, not on regular phonology. Except for finals in Kelenga, whose melodies are completely overwritten, no case of tonal ablaut described here involves replacive tones.

The scan-classify-overlay model is an important type of “grammatical tone” (Rolle 2018). However, the latter rubric is a loose grab-bag of structurally divergent processes. Without leaving the immediate geographical vicinity of Bozo and Bangime, i.e. Central Mali, one can find two other fundamentally distinct processes that involve tone and grammar: tonosyntax and tonation.

Tonosyntax, a specialty of Dogon languages, has been described in Heath & McPherson (2013) and subsequent papers. Its basic formula is [X …]^{O} Y, or with the alternative linear order Y ^{O}[… X], where X is a lexical head (noun in NP, verb in VP), Y is a modifier, and ^{O} indexes the application of a tone-overlay variable, such as {L} or {HL}, that is controlled by Y but targeted at X and any intervening words. Unlike

[20] Transcriptions here do not include prepausal tone-lowering, which would convert e.g. *tōō* to *tōò* as a citation form.

scan-classify-overlay tonal ablaut, tonosyntax does care about the semantic relationship between controller and target. Issues discussed in the tonosyntax literature include: a) why are some modifiers controllers while others are not; b) what happens when a multi-word NP has two competing controllers; c) what happens when a controller and a non-controller switch their linear positions; d) how can two modifiers be individually non-controllers, yet their combination triggers an overlay; e) are there parallels in verbal morphology to NP tonosyntax; and f) how did NP tonosyntax originate?

Quite distinct from tonosyntax and from scan-classify-overlay tonal ablaut is **tonation** (Heath & Sherwood forthcoming) which combines the unbounded prolongation elsewhere typical of terminal intonation, often accompanied by terminal pitch decline, with the lexical and grammatical functions of tone. At the lexical level, the relevant forms are expressive adverbials whose final segment (vowel or nasal) is prolonged at will. At the grammatical level, the same prolongation combined with terminal low-pitch target occurs in conjoined NPs and willy-nilly conditional antecedents ('whether it rains or it doesn't rain, …'), both of which involve juxtaposition of paired phrases internal to a larger sentence.

African tonal languages are full of minor tonal idiosyncracies, such as floating tones left over from the diachronic segmental elision of a grammatical morpheme. However, the trifecta of scan-classify-overlay tonal ablaut, tonosyntax, and tonation are all sufficiently systematic, and sufficiently different from each other, to be of general interest.

Abbreviations and symbols

Adj	adjective
H	high tone
/H/	stem-wide high-tone melody
{H}	high-tone overlay
H*L	variable number of high tones, then a single L tone
IPA	International Phonetic Alphabet
L	low tone
M	mid tone
N	noun
Pl	plural
PP	postpositional (or prepositional) phrase
Sg	singular
SH	super-high tone
VblN	verbal noun

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Jeffrey Heath

Scan-classify-overlay model for Bozo and Bangime nominal tones

Nominal compounds (N-N) and noun-adjective (N-Adj) sequences share a distinctive morphotonology and behave as (extended) prosodic words in four Bozo languages studied. Input N and Adj stems of various tone melodies are scanned for tonal characteristics that classify the numerous melodies into just two melodic superclasses for initials. Separately, finals are also scanned and classified. The criterial tonal feature varies from language to language and from initial to final; it may be the leftmost tone element or a configuration (level versus contour). Tone overlays are then associated with the initial, the final, or both jointly. In some cases, the lexical melody of the initial is overwritten locally, but is expressed at a distance by determining or at least influencing the overlay on the final.

In the neighboring isolate Bangime, a structurally similar scan-classify-overlay system is at work in definite and possessed NPs.

In Bozo and Bangime, an overlaid tone pattern may differ from or even invert the (lexical) melody. However, because overlays are associated with melodic superclasses, they allow partial recovery of melodies by listeners. The scan-classify-overlay model is distinct both from ordinary tonal morphophonology (which directly operates on lexical tones) and from true replacive tonal ablaut (which irrecoverably erases melodies).

Keywords: grammatical tone, tonal ablaut, scan-classify-overlay, Bozo languages, Sorogaama, Jenaama, Tigemaxo, Kelenga, Bangime

Jeffrey Heath

Le modèle « scanner – classifier – superposer » pour les tons nominaux en bozo et bangime

Les composés nominaux (N-N) et les séquences nom-adjectif (N-Adj) partagent une morphotonologie distinctive, et agissent comme des mots prosodiques (élargis), dans quatre langues bozo étudiées. Les noms et les adjectifs qui servent de point de départ sont scannés à la recherche des caractéristiques tonales qui permettent le classement des nombreuses mélodies en seulement deux supercatégories mélodiques pour les initiaux. Séparément, les finaux sont également scannés et triés. La caractéristique décisive varie d'une langue à l'autre et de l'initial au final; elle peut être le premier élément tonal ou une configuration (plate ou modulée). Des superpositions tonales sont ensuite associées avec l'initial, avec le final, ou avec tous les deux conjointement. Dans certains cas, la mélodie lexicale de l'initial est supprimée

localement, mais s'exprime à distance en déterminant ou du moins en influençant la superposition tonale sur le final. Dans la langue isolée voisine bangime, un système scanner-classifier-superposer à structure pareille est à l'œuvre dans les phrases nominales définies et possessives.

En bozo et en bangime, la superposition tonale peut se différencier de, ou même invertir, la mélodie lexicale.

Nonobstant, dû à l'association entre les superpositions tonales et les supercatégories mélodiques, les superpositions permettent la récuperation des mélodies par les auditeurs. Le modèle scanner-classifier-superposer se distingue de la morphotonologie ordinaire (qui opère directement sur les tons lexicaux) et aussi du véritable ablaut remplaçant (qui supprime les mélodies sans traces).

Mots-clé : ton grammatical, mutation tonale, modèle « scanner-classifier-superposer », langues bozo, sorogama, jenaama, tigemaxo, kelenga, bangime

Джеффри Хит

Модель «просмотр-классификация-наложение» для тонов в именных группах в языках бозо и бангиме

Именные группы (N-N) и последовательности «существительное-прилагательное» (N-Adj) отличаются идентичными морфотонологическими особенностями и ведут себя как расширенные просодические слова в четырёх языках бозо, рассматриваемых в данной статье. На входе, именные и адьективные основы, несущие разные тоны, сканируются в отношении своих тональных характеристик и распределяются по двум суперклассам, в зависимости от тональных мелодий исходных форм. Отдельно от этого, финальные элементы групп также просматриваются и классифицируются. Диагностический тональный признак (ровный или модулированный тональный рисунок) варьирует от языка к языку, и различается для начального и конечного элементов. Затем происходит наложение тонов на начальный или конечный элемент конструкции, или же на оба элемента. В некоторых случаях лексическая тональная мелодия начального компонента оказывается нейтрализованной локально, но она выражается дистантно, определяя тональный рисунок, который накладывается на конечный элемент.

В соседнем языке бангиме, который является генетическим изолятом, структурно сходная система «просмотр-классификация-наложение» действует в определённых и посессивных именных группах.

В бозо и бангиме налагаемый тональный рисунок может отличаться от лексического тона или даже быть противоположным ему. Тем не менее,

поскольку такое наложение ассоциируется с суперклассами тональных мелодий, они позволяют слушателю частично идентифицировать исходные тональные мелодии. Модель «просмотр-классификация-наложение» отличается и от обычной тональной морфологии (которая напрямую обращается к лексическим тонам) и от полноценной заместительного тонального аблаута (при котором исходная тональная мелодия стирается бесследно).

Ключевые слова: грамматический тон, тональный аблаут, модель «просмотр-классификация-наложение», языки бозо, сорогама, дженнама, тигемахо, келенга, бангиме